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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/506,792	09/07/2004	Koichi Takeuchi	SON-2626	6537

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EXAMINER

BOOTH, RICHARD A

ART UNIT	PAPER NUMBER
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2812

DATE MAILED: 08/03/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/506,792

Applicant(s)

TAKEUCHI

Examiner

Richard A. Booth

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>0904</u> . | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Drawings

Figures 1-8 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 2-3 and 11-13 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The specification, as originally filed, does not provide support for the protective layers including organic-based material. Rather, the specification clearly states in

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numerous places that the protective layer is inorganic such as silicon dioxide (see page 34-lines 13-15 of specification). For purposes of examination, it will be assumed that this is an inadvertent error and that the claims were meant to state that the protective layers were inorganic.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 9 and 19 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 9 and 19 contains the trademark/trade name teflon. Where a trademark or trade name is used in a claim as a limitation to identify or describe a particular material or product, the claim does not comply with the requirements of 35 U.S.C. 112, second paragraph. See *Ex parte Simpson*, 218 USPQ 1020 (Bd. App. 1982). The claim scope is uncertain since the trademark or trade name cannot be used properly to identify any particular material or product. A trademark or trade name is used to identify a source of goods, and not the goods themselves. Thus, a trademark or trade name does not identify or describe the goods associated with the trademark or trade name. In the present case, the trademark/trade name is used to identify/describe the interlayer insulator and, accordingly, the identification/description is indefinite.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-3 and 11-13 are rejected under 35 U.S.C. 102(b) as being anticipated by Jones et al., EP 0 241 739.

Jones et al. shows the invention as claimed including a method of producing a semiconductor device, including: a step of depositing organic-based interlayer insulator films (see abstract, lines 11-15) containing a silylating agent; a step of forming an opening portion on the organic based interlayer insulator films; and a step of performing silylation to reform a wall surface portion of the organic based interlayer insulation films exposed in said opening portion (see col. 6-lines 34-37 and figs 1-2).

Concerning claim 2, note the method further includes the steps of: a step of forming protective layers including an organic based insulation material on a surface of said opening portion wall surface subjected to silylation.

With regard to claims 3 and 12-13, the method is also characterized by the inner wall surface of said opening portion, including silylated molecules as a result of silylation is exposed to oxide plasma to form a silicon oxide film for protecting the inner wall of the opening portion in a step of forming the protective films (see, for example, col. 12-lines 20-28).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 4-8 and 14-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jones et al., EP 0 241 739 in view of Admitted prior art.

Jones et al. is applied as above but does not expressly disclose a step of forming an organic-based substance in a state of being formed with said opening portion and removing the organic-based substance from said opening portion after the silylation, said opening portion comprising a via hole in a dual-damascene wiring process, a step of forming a wiring trench connected to said via hole on an upper interlayer insulation film through the steps of coating a photoresist and performing exposure and development in a state of being formed with the via hole being further included, a step of forming an etching stopper film of silicon nitride on a lower interlayer insulator film.

Admitted prior art discloses step of forming an organic-based substance 108 in a state of being formed with said opening portion and removing the organic-based substance from said opening portion, said opening portion comprising a via hole in a dual-damascene wiring process, a step of forming a wiring trench CG connected to said via hole on an upper interlayer insulation film through the steps of coating a photoresist and performing exposure and development in a state of being formed with the via hole

being further included, and a step of forming an etching stopper film 105 of silicon nitride on a lower interlayer insulator film (see figs. 1-8 and page 2-line 3 to page 4-line 17 of specification). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Jones et al. so as to form the above mentioned dual damascene structure because in such a way a device with higher speed and lower power can be formed.

Claims 9 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jones et al., EP 0 241 739 in view of Admitted prior art as applied to claims 4-8 and 14-18 above, and further in view of Takeda et al., U.S. Patent 4,347,306 or Uchiyama et al., U.S. Patent 4,394,211.

Jones et al. and the admitted prior art are applied as above but do not expressly disclose the interlayer insulator film being formed of one of the claimed organic materials. Takeda et al. discloses using a polyimide 4 as an interlayer insulator film (see figs. 1a-1e and col. 6-lines 16-51). Furthermore, Uchiyama et al. also discloses using a polyimide (28 or 30) as an interlayer insulator film (see figs. 2a-2g and col. 3-line 34 to col. 4-line 56). In view of these disclosures, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Jones et al. modified by the admitted prior art so as to form the interlayer insulator film of polyimide because the use of the polyimide layer allows the formation of fine patterns.

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jones et al., EP 0 241 739 in view of Chiang et al., U.S. Patent 6,037,249.

Jones et al. is applied as above but does not expressly disclose where the organic-based interlayer is porous.

Chiang et al. discloses forming a porous organic-based interlayer between metal lines (see col. 3-lines 55-65). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Jones et al. so as to form a porous organic-based interlayer because in such a way the capacitance between the interconnections will be reduced.

Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jones et al., EP 0 241 739 in view of Admitted prior art. as applied to claims 4-8 and 14-18 above, and further in view of Chiang et al., U.S. Patent 6,037,249.

Jones et al. is applied as above but does not expressly disclose where the organic-based interlayer is porous.


Chiang et al. discloses forming a porous organic-based interlayer between metal lines (see col. 3-lines 55-65). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Jones et al. modified by the admitted prior art so as to form a porous organic-based interlayer because in such a way the capacitance between the interconnections will be reduced.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Richard A. Booth whose telephone number is (571) 272-1668. The examiner can normally be reached on Monday-Thursday from 7:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Lebentritt can be reached on (571) 272-1873. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.


Richard A. Booth
Primary Examiner
Art Unit 2812

July 24, 2006